WHAT IS CLAIMED IS:

1. An image processor for converting input image data having a first number of tones into image data of a second number of tones lower than said first number by a halftone processing and for outputting an image corresponding to the image data, said image processor comprising:

halftone processing means for halftone-processing said input image data using a dither threshold plane and for providing the halftone-processed image data; and

image output means for outputting an image corresponding to said halftone-processed image data provided from said halftone processing means, said image processing means having different output position accuracies between a main scan direction and a sub-scan direction, wherein

said dither threshold plane comprises a plurality of same size unit threshold matrixes; a relatively medium to high thresholds array in a threshold range of a reference threshold array which determines thresholds in the unit threshold matrix, is an aperiodic array in the unit threshold matrix and an anisotropic array including neighboring thresholds having close values in a direction coincident with a direction in which the output position accuracy of said image output means is relatively low; and said image output means outputs an

image having serial medium to high tone dots in the scan direction.

2. An image processor according to claim 1, wherein

relatively low thresholds in said threshold range are arranged to be dispersed isotropically in said unit threshold matrix; and said image output means outputs an image having low tone dots isotropically dispersed.

3. An image processor according to claim 1, wherein

relatively low thresholds in said threshold range are arranged to be dispersed anisotropically in said unit threshold matrix; and said image output means outputs an image having low tone dots anisotropically dispersed.

4. An image processor according to claim 1, wherein

said halftone processing means has a first reference threshold array having relatively low thresholds in said threshold range are dispersed isotropically in said unit threshold matrix and a second reference threshold array having the low thresholds dispersed anisotropically, and selects one of said first and second reference threshold arrays according to the output position accuracy of said image output means to use the selected reference threshold array for the halftone processing.

5. An image processor according to claim 1, wherein

said aperiodic medium to high threshold array is deduced from an approximation calculation model imitating output characteristics of said image output means.

6. An image processor according to claim 1, wherein

said anisotropic medium to high threshold array is determined by using convolution filtering operation; anisotropic strength is determined by adjusting a constant of the convolution filtering operation; an optimum value of the constant is determined by a diameter and a distance of lowest tone level dots actually printed.

7. An image processor according to claim 1, wherein

said aperiodic medium to high threshold array is set at random.

8. An image processor according to claim 1, wherein

said anisotropic medium to high threshold array is set to have high anisotropy when a difference in said output position accuracy of said image output means between the main scan direction and the sub-scan direction is large and to have low anisotropy when the difference in said output position accuracy is small.

9. An image processor according to claim 1, wherein

said low thresholds are lower 20% thresholds of said threshold range.

10. An image processor for converting input image data having a first numbers of tones into image data of a second number of tones lower than said first number by a halftone processing and for outputting an image corresponding to said image data, said image processor comprising:

halftone processing means for halftone-processing said input image data using a plurality of dither threshold planes and for providing the halftone-processed image data; and

image output means for outputting an image corresponding to said halftone-processed image data provided from said halftone processing means, the image output means having different output position accuracies between a main scan direction and a sub-scan direction, wherein

each of the dither threshold planes comprises a plurality of same unit threshold matrixes; in the unit threshold matrix, serial thresholds of relatively low thresholds, medium thresholds and high thresholds in a predetermined threshold range corresponding to an entire tone range of said input image data are arranged to extend over one or more of said threshold planes;

threshold planes in which the low thresholds are arranged are fewer than threshold planes in which said medium and high thresholds are arranged, respectively, whereby said image output means has more sizes of dots outputted when the input image data is in a low tone range than sizes of dots outputted when the input image data is in a medium to high tone ranges.

11. An image processor according to claim 10, wherein

said low thresholds are lower 20% thresholds of said predetermined threshold range.

12. An image processor according to claim 10, wherein

a threshold array extending over said plurality of dither threshold planes is determined based on basic tone characteristics of said image output means.

13. An image processor according to claim 10, wherein

a threshold array extending over a plurality of threshold planes is determined based on the output position accuracy of said image output means.

14. An image processor for converting input image data having M tones per pixel into image data having N tones for K pixels by a halftone processing and for outputting an image corresponding to the image data, K set not more than 2 and N set not more than 2, said image processor comprising:

image conversion means for converting said input image data by the halftone processing and for providing the halftone-processed image data; and

image output means for outputting an image corresponding to said halftone-processed image data provided from said image conversion means, said image output means having different output position accuracies between a main scan direction and sub-scan direction, wherein

said dither threshold plane comprises a plurality of same size unit threshold matrixes; an array of relatively medium to high thresholds in a threshold range of reference threshold array which determines thresholds in the unit threshold matrix, is an aperiodic array and an anisotropic array having neighborhood thresholds in a direction coincident with a scan direction in which the output position accuracy of said image output means is relatively low, having close values; and said image output means outputs an image having serial medium and high tone dots in the scan direction.

15. An image processor according to claim 14, wherein

the relatively low thresholds in said threshold range are arranged to be dispersed isotropically in said unit threshold matrix; and said image output means outputs an image having low tone dots dispersed

isotropically.

16. An image processor according to claim 14, wherein

the relatively low thresholds in said threshold range arranged to be dispersed anisotropically in said unit threshold matrix; and said image output means outputs an image having low tone dots dispersed anisotropically.

17. An image processor according to claim 14, wherein

said image conversion means has a first reference threshold array having the relatively low thresholds in said threshold range dispersed isotropically in said unit threshold matrix and a second reference threshold matrix having the low thresholds dispersed anisotropically, and selects one of said first and second reference threshold arrays in accordance with the output position accuracy of said image output means to use the selected reference threshold array for the halftone processing.

18. An image processor according to claim 14, wherein

said aperiodic array of medium to high thresholds is deduced from an approximation calculation model imitating output characteristics of said image output means.

19. An image processor according to claim 14,

wherein

said aperiodic array of medium to high thresholds is set at random.

20. An image processor according to claim 14, wherein

said anisotropic threshold array of medium to high thresholds is set to have high anisotropy when a difference in said output position accuracy of said image output mans is large between the main scan direction and the sub-scan direction and to have low anisotropy when the difference in said output position accuracy is small.

21. An image processor according to claim 14, wherein

said low thresholds are lower 20% thresholds of said threshold range.

22. An image processor for converting color input image having a first number of tones into image data of a second number of tones lower than said first number by a halftone processing and for outputting an image corresponding to the image data, said image processor comprising:

halftone processing means for halftone-processing the input image data using a dither threshold plane and for providing the halftone-processed image data; and

color image output means for outputting an image corresponding to said halftone-processed image data

provided from said halftone processing means, wherein

said dither threshold plane comprises a plurality of same size unit threshold matrixes; in respect of at least two types of color components, an array of relatively medium to high thresholds in a threshold range of reference threshold array which determines thresholds in the unit threshold matrix, is an aperiodic array and an anisotropic array including neighboring thresholds having close values in a direction coincident with a scan direction in which the output position accuracy of said image output means is relatively low; and said image output means outputs an image having serial medium and high tone dots in the scan direction.

23. An image processor according to claim 22, wherein

a threshold array used for at least one type of color component is a reference threshold array obtained by calculation in advance and other threshold arrays used for remaining color components are obtained by converting the reference threshold array by one of inversion, rotation and shift processings.

24. An image processor according to claim 22, wherein

said unit threshold matrix comprises a plurality of sub-threshold matrixes; in the sub-threshold matrix, a relatively low threshold array in said threshold

range differs according to colors, whereby said image output means does not output low tone dots of different colors at a same position.

25. An image processor according to claim 23, wherein

said unit threshold matrix comprises a plurality of sub-threshold matrixes; in the sub-threshold matrix, a relatively low threshold array in said threshold range differs according to colors, whereby said image output means does not output low tone dots of different colors at a same position.

26. An image processor according to claim 22, wherein

the relatively low thresholds in said threshold range are arranged to be dispersed isotropically in said unit threshold matrix; and said image output means outputs an image having low tone dots dispersed isotropically.

27. An image processor according to claim 22, wherein

the relatively low thresholds in said threshold range are arranged to be dispersed anisotropically in said unit threshold matrix; and said image output means outputs an image having low tone dots dispersed anisotropically.

28. An image processor according to claim 22, wherein

said halftone processing means has a first unit threshold matrix in which the relatively low thresholds in said threshold range are arranged to be dispersed isotropically and a second unit threshold matrix in which the low thresholds are arranged to be dispersed anisotropically, and uses one of said first and second unit threshold matrixes according to the output position accuracy of said image output means to carry out the halftone processing.

29. An image processor according to claim 22, wherein

said halftone processing means carries out the halftone processing using a threshold array extending over a plurality of dither threshold planes;

serial thresholds of relatively low thresholds, medium thresholds and high thresholds in a predetermined threshold range corresponding to an entire tone range of said input image data are arranged to extend over one or more of said threshold planes for each color component; threshold planes in which the low thresholds are arranged are fewer than threshold planes in which said medium and high thresholds are arranged, respectively, whereby said image output means has more sizes of dots outputted when the input image data is in a low tone range than sizes of dots outputted when the input image data is in a medium to high tone ranges.

30. An image processor according to claim 22,

wherein

said halftone processing means has a first unit threshold matrix having the relatively low thresholds in said threshold range arranged to be dispersed isotropically and a second unit threshold matrix having the low thresholds arranged to be dispersed anisotropically, and uses one of said first and second unit matrixes according to the output position accuracy of said image output means to carry out the halftone processing.

31. An image processor for converting color input image having a first number of tones into image data of a second number of tones lower than said first number by a halftone processing and for outputting an image corresponding to the image data, said image processor comprising:

halftone processing means for halftone-processing the input image data using a dither threshold plane and for providing the halftone-processed image data; and

color image output means for outputting an image corresponding to said halftone-processed image data provided from said halftone processing means, said color image output means having different output position accuracies between a main scan direction and a sub-scan direction, wherein

said dither threshold plane comprises a plurality of same size unit threshold matrixes; in respect of at

least two types of color components an array of relatively medium to high thresholds in a threshold range of reference threshold array which determines thresholds in the unit threshold matrix, is an aperiodic array in said unit threshold matrix and is an anisotropic array including neighboring thresholds having close values in a direction coincident with a scan direction in which the output position accuracy of said image output means is relatively low; and a threshold array in respect of color components other than said two color components is a periodic and ordered array in said unit threshold matrix in an entire threshold range.

32. An image processor for converting color input image having a first number of tones into image data of a second number of tones lower than said first number by a halftone processing and for outputting an image corresponding to the image data, said image processor comprising:

halftone processing means for halftone-processing the input image data using a dither threshold plane and for providing the halftone-processed image data; and

color image output means for outputting an image corresponding to said halftone-processed image data provided from said halftone processing means, said color image output means having different output position accuracies between a main scan direction and a

sub-scan direction, wherein

said dither threshold plane comprises a plurality of same size unit threshold matrixes, an array of relatively medium to high thresholds in a threshold range of reference threshold array which determines thresholds in the unit threshold matrix, is an aperiodic array in said unit threshold matrix and is an anisotropic array including neighboring thresholds having close values in a direction coincident with a scan direction in which the output position accuracy of said image output means is relatively low, having close values; and

said halftone processing means carries out the halftone processing using said threshold array for at least two types of color components and carries out the halftone processing based on an error diffusion processing for color components other than said two color components.

33. An image processor according to claim 32, wherein

said halftone processing means carries out the halftone processing using, as a threshold array extending over said plurality of dither threshold planes, a threshold array in which substantial resolutions of color components other than the yellow component are highest.

34. An image processor for converting color input

image data having a first number of tones into image data having a second number of tones lower than said first tone level by a halftone processing and for outputting an image corresponding to the image data, said image processor comprising:

halftone processing means for carrying out the halftone processing using a plurality of threshold planes and for providing halftone-processed image data; and

color image output means for outputting an image corresponding to said halftone-processed image data provided from said halftone processing means, wherein

said color input image data contains a yellow component, serial thresholds for respective colors are arranged to extend over said plurality of dither threshold planes, the dither threshold planes over which said serial thresholds extend for yellow are the most of the dither threshold planes for any other color, whereby types of output yellow dot sizes are more than type of dot sizes of other colors.

35. An image processor according to claim 34, wherein

said color input image contains a yellow component;

thresholds of similar sizes are arranged on one threshold plane for color components other than the yellow component, the serial thresholds are forced to

be arranged to extend over other threshold planes near thresholds corresponding to a specific tone, thereby preventing an image containing all single-size dots from being printed if a uniform input image of said specific tone is reproduced.

36. An image processor for converting input image data having a first number of tones into image data of a second number of tones lower than said first tone level by a halftone processing and for outputting an image corresponding to the image data, said image processor comprising:

halftone processing means for halftone-processing said input image data using a dither threshold plane and for providing the halftone-processed image data, thresholds into which gamma conversion characteristics of a printer is incorporated, arranged on said dither threshold plane; and

image output means for outputting an image corresponding to said halftone-processed image data provided from said halftone processing means.

37. An image processor according to claim 36, wherein

among the thresholds arranged in said threshold plane, the number of same thresholds is determined according to gamma characteristics of a printer.

38. An image processor according to claim 36, wherein

said halftone processing means halftone-processes said input image data using a plurality of dither threshold planes, thresholds, into which the gamma characteristics of the printer is incorporated, arranged on said plurality of dither threshold planes.

39. An image processor according to claim 38, wherein

among thresholds arranged in said plurality of threshold planes, the number of same thresholds is determined according to the gamma characteristics of the printer.